

What is claimed is:

1. A sensor for monitoring an environmental parameter in concrete comprising:
  - (a) an enclosure for embedding in concrete;
  - (b) a detecting means connected to the enclosure for detecting at least one environmental parameter in concrete, the detecting means comprising at least one capacitive element for measuring capacitive change;
  - (c) an active material connected to the enclosure,
    - (i) the active material being liable to respond to the environmental parameter, and
    - (ii) the active material being operably connected to the capacitive element;
  - (d) a RFID chip mounted within the enclosure, the RFID chip being operably connected to the detecting means; and
  - (e) an antenna operably connected to the RFID chip,
    - (i) the antenna being operably connected to the detecting means, and
    - (ii) the antenna being part of an L-R-C circuit whose resonance frequency shifts within an assigned frequency band.
2. The sensor of claim 1 further comprising:
  - (f) a transceiver electromagnetically coupled with the antenna.
3. The sensor of claim 2 further comprising:

(g) an information processor in communication with the transceiver, the information processor being adapted to identify the environmental parameter from data generated by the transceiver.

4. The sensor of claim 1 wherein the shift in resonance frequency is a shift in frequency of a re-radiated signal.

5. The sensor of claim 2 wherein the transceiver is operably connected to a means for measuring the change in resonance frequency of the sensor's L-R-C circuit.

6. The sensor of claim 3 wherein the environmental parameter is identified by measuring a shift in frequency of complex impedance ( $Z$ ) within the assigned frequency band.

7. The sensor of claim 1 or 2 wherein the capacitive change is effected by movement of the capacitive element.

8. The sensor of claim 1 or 2 wherein the capacitive change is effected by change in permittivity of the active material.

9. The sensor of claim 1 or 2 wherein the capacitive element comprises a parallel plate capacitor.

10. The sensor of claim 1 or 2 wherein the parallel plate capacitor is a perforated parallel plate capacitor.

11. The sensor of claim 1 or 2 wherein the capacitive element comprises an interdigitated capacitor.

12. The sensor of claim 1 or 2 wherein at least a portion of the enclosure is permeable.

13. The sensor of claim 1 or 2 wherein the environmental parameter is moisture content.

14. The sensor of claim 1 or 2 wherein the environmental parameter is temperature.
15. The sensor of claim 1 or 2 wherein the environmental parameter is pH.
16. The sensor of claim 1 or 2 wherein the environmental parameter is ion concentration.
17. The sensor of claim 1 or 2 wherein the ion is chloride.
18. The sensor of claim 1 or 2 wherein the ion is sodium.
19. The sensor of claim 1 or 2 wherein the ion potassium.
20. The sensor of claim 1 or 2 wherein the active material is a dielectric material.
21. The sensor of claim 1 or 2 wherein the active material is a hydrogel.
22. The sensor of claim 1 or 2 wherein the assigned frequency band is 13.56 MHz and the re-radiated signal is within a frequency band 27.125 MHz.
23. A method for applying an active material within a MEMS device comprising pouring at least one precursor material of the active material into an opening of the MEMS device.